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The spider genus *Centromerus* (Aranei Linyphiidae) in the fauna of Siberia and the Russian Far East, with an analysis of its distribution.

Пауки рода *Centromerus* (Aranei Linyphiidae) в фауне Сибири и Российского Дальнего Востока, с анализом их распространения.

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KEY WORDS: *Centromerus*, Siberia, Russian Far East, distribution.
КЛЮЧЕВЫЕ СЛОВА: *Centromerus*, Сибирь, Российский Дальний Восток, распространение.

ABSTRACT: The *Centromerus* fauna of Siberia and the Russian Far East consists of 10 species. Three new species are described: *C.amurensis* sp.n., *C.pacificus* sp.n., and *C.ussuricus* sp.n.; *C.clarus* (L.Koch, 1879) and *C.terrigenus* Yaginuma, 1972 are redescribed, the latter is recorded in Russia for the first time. The Siberio-Far Eastern records of 5 *Centromerus* species are considered as misidentifications. The generic independence of *Tallusia*, in the limits of the *expertus*-group by Polenec & Thaler [1980], is accepted; *C.vindobonensis* Kulczynski, 1898 = *Tallusia vindobonensis*, comb.nov.; *Atopogyna* Millidge, 1984 = *Centromerus* Dahl, syn.nov.; *C.incultus* Falconer, 1915 = *C.semiater* (L.Koch), syn.nov.; *C.scambus* Locket, 1968 = *Syedra scamba*, comb.nov. Altogether, the genus comprises 72 species. The regioning of the Holarctic based on the distribution of *Centromerus* is proposed; the history of the formation of the modern generic range is discussed.

РЕЗЮМЕ: Фауна Сибири и Российского Дальнего Востока включает 10 видов *Centromerus*. Описаны три новых вида: *C.amurensis* sp.n., *C.pacificus* sp.n и *C.ussuricus* sp.n., переописаны *C.clarus* (L.Koch) и *C.terrigenus* Yaginuma, последний впервые отмечен в России. Указания для Северной Азии еще 5 видов *Centromerus* признаны основанными на ошибочных определениях. Подтвержден родовой статус *Tallusia*, принимаемого в объеме *expertus*-группы по Polenec & Thaler [1980]. *C.vindobonensis* Kulczynski = *Tallusia vindobonensis*, comb.nov.; *Atopogyna* Millidge = *Centromerus* Dahl, syn.nov.; *C.incultus* Falconer = *C.semiater* (L.Koch), syn.nov.; *C.scambus* Locket = *Syedra scamba*, comb.nov. В общей сложности род включает 72 вида. Предложено районирование Голарктики, основанное на распространении Centromerus, обсуждена история формирования современного ареала рода.

The present paper continues our studies on the linyphiids of North Asia, this time dealing with a large (more than six dozen species) linyphiine genus *Centromerus* F.Dahl, 1886. We accept here the generic independence of the monobasic *Birgerius* Saaristo, 1973, comprising *Centromerus microps* (Simon, 1911), as well as of *Tallusia* Lehtinen & Saaristo, 1972, completely corresponding to the *expertus*-group by Polenec & Thaler [1980] (i.e. *C.expertus* (O.Pickard-Cambridge, 1871), *Tallusia bicristata* Lehtinen & Saaristo, 1972 and *C.vindo-*

bonensis Kulczynski, 1898); a comb.nov. for the latter species should be established.

On the contrary, the generic independence of the monobasic *Atopogyna* Millidge, 1984, comprising *C. conupalpis* (O.Pickard-Cambridge, 1875) seems to be doubtful. The erection of this genus was based solely on its highly aberrant epigynal structure; Millidge [1984: 250] estimated the scale of such differences as subfamilial. Meanwhile, the absence of any sufficient differences in palpal structures between *Atopogyna* and *Centromerus* was noted in the same publication twice [Millidge, 1984: 205 and 265]. Due to this reason, Helsdingen's [1973] opinion on the unition of *C.cornupalpis* and six other Nearctic *Centromerus* into a single species-group seems to be more convincing. To our mind, according to Millidge's [1984] criteria, *Centromerus* should be divided at least into eight separate genera; if such a generic concept in the Centromerini is accepted in the future, the independence of *Atopogyna* must be accepted as well. Now, however, we state *Atopogyna* = *Centromerus* syn.nov.

The genus is restricted to the Holarctic; a single non-Holarctic member, *Centromerus scambus* Locket, 1968, from Angola, must be transferred into the genus *Syedra* Simon, 1884 (comb.nov.)*. The great majority of its members are distributed in the West Palearctic (Europe and the Mediterranean); a poor but highly endemic *Centromerus* fauna existing in the Nearctic has been revised by Helsdingen [1973]. Meanwhile, the East Palearctic fauna of the genus seems to be very poorly investigated. Only a few species were described from Asia, some of them erroneously placed into *Centromerus*; such are the Japanese *C.higoensis* H.Saito, 1984 and *C.nipponicus* H.Saito, 1984 [Eskov, 1991], as well as the Korean *C.kayacensis* Paik, 1965 [Eskov & Marusik, 1992]. Asiatic records of some *Centromerus* species seem to be misidentifications and should be rechecked.

New materials collected over the last decade in numerous localities in Siberia and the Russian Far East contain many *Centromerus* species, including some new and little-known ones. The descriptions of these species and new faunistic records of well-known ones are the main subject of the present paper. Hence, the main lacuna in the knowledge on the world distribution of the genus seems to be filled in. Therefore, an analysis of the zoogeography of *Centromerus* is possible now worldwide.

Besides the authors' collectings, abbreviated in the text as (KE) and (YM), respectively, this paper is based on materials taken by: Dr. A.M.Basarukin, Yuzhno-Sakhalinsk (AB); Mr. V.V.Belov, Moscow (VB); Dr. S.B.Bukhalo, Magadan (SB); Dr. S.N.Danilov, Ulan-Ude (SD); Mr. G.N.Ganin, Khabarovsk (GG), Dr. S.I.Golovatch, Moscow (SG), Mr. D.K.Kurenstchikov, Khabarovsk (DK); Dr. G.F.Kurtcheva, Moscow (GK), Dr. D.V.Logunov, Novosibirsk (DL), Dr. K.G.Mikhailov (KM), Moscow, Dr. E.V.Mikhalyova, Vladivostok (EM); Dr. N.S.Ryabinin, Khabarovsk (NR); Dr. A.S.Ryabukhin, Magadan (AR); Dr. W.Schawaller, Stuttgart (WS), Dr. M.T.Sternbergs, Riga (MS); Dr. S.V.Toms, Moscow (ST), Mr. A.A.Voitsyk, Moscow (AV); Dr. B.P.Zakharov, Novosibirsk (BZ); Mr. S.L.Zonshtein, Frunze (SZ). We are most grateful to all the abovementioned persons. Before going further, we wish to particularly acknowledge the help of S.I.Golovatch (Moscow), who kindly checked the English of the final draft.

Type materials belong to the collection of the Zoological Museum of the Moscow State Univerity; some para- and non-types are deposited in Senckenberg Museum, Frankfurt a.M. (SMF). The following abbreviations have been accepted in the text: Fe - femur, Ti - tibia, Mt - metatarsus, Tm - position of metatarsal trichobothrium. The leg joints' spinulation is given in the following formula: Ti I - 2130; this means, that tibia I has two dorsal,

* It should be emphasized that Locket [1968: 117] noted himself numerous *Syedra* characters of the described species (including palpal structures), and the main reason for its assignment into *Centromerus* was the absence of metatarsal spines. Such a reason seems to be too strange, because in the genus *Centromerus* the metatarsal spines are usually present, except for a single case of *C.denticulatus* (Emerton, 1909) aberrant in several non-genital characters [see Helsdingen, 1973].

one pro-, three retrolateral, and no ventral spines. All measurements in the descriptions are given in mm.

Centromerus aequalis (Westring, 1851).

Erigone aequalis Westring, 1851: 44.
Centromerus aequalis: Wiehle, 1956: 54 (♂, ♀).

MATERIAL. 1♂ - Kazakhstan, East-Kazakhstan Area, environs of Zaisan Town, Saur Mt. Range, Kek-Bulak Canyon, forest of *Larix sibiricus*, 17.VII.1989, SZ.

DISTRIBUTION. Europe [Wiehle, 1956]; in Asia - southwestern edge of Siberia (original data) and Baikal Lake [Sternbergs, 1981].

Centromerus amurensis sp.n.
Fig. 1a-c.

Centromerus arcanus (non Pickard-Cambridge, 1873): Eskov, 1992: 55.

MATERIAL. Holotype, ♂ environs of Khabarovsk, Bolshe-Khekhtsirsky State Reserve, forest of *Picea* and *Abies*, 9.VI.1987, DL. Paratypes: 3♂, 7♀ - together with holotype; 1♂ - same locality and biotope, IX.1990, GG; 1♂ 1♀ (SMF) - same locality, forest of *Picea, Betula* and *Pinus koraiensis*, 6-10.VI.1991, SG & WS; 2♀ - Khabarovsk Province, Ulchsky District, Sofiyskoye, Skalisty Mt. Range, forest of *Picea* with green mosses, VII.1990, GG; 1♀ - 12 km NW off Bikin Town, forest of *Quercus, Betula* and *Populus*, 26.V-4.VI.1991, SG & WS; 3♀ - Maritime Province, Chuguyevka District, Pravaya Sokolovka River (basin of Ussuri River), forest of *Picea*, 28.VIII.1974, GK; 1♀ - Chuguyevka District, environs of Lesogorsk, VIII.1978, ST.

DESCRIPTION. Total length of male/female 2.13-2.60/1.95-2.38. Carapace yellow to brownish-yellow, its length/width 0.95-1.13/0.75-0.88 in male, 0.78-0.98/0.58-0.65 in female. Chelicerae with three promarginal teeth; male chelicera with anterolateral longitudinal row of short spines. Legs yellow to brownish-yellow, length of joints I/IV 1.00/1.08+ +0.28/0.28+0.90/0.95+0.73/0.83+0.50/0.53 in male, 0.78/0.88+0.25/0.25+0.65/0.78+0.53/ /0.58+0.40/0.43 in female; leg spinulation: Fe I 1100, Fe II 1000, Fe III-IV 0000, Ti I 2100, Ti II-IV 2000, Mt I-II 1000, Mt III-IV 0000; metatarsi I-III with a trichobothrium, Tm I - 0.33. Abdomen grey to dark grey. Genitalia of both male and female as in Fig. 1a-c.

DIAGNOSIS. The new species belongs to the *sylvaticus*-group and is the closest relative of the Far Eastern *C.terrigenus* Yaginuma, 1972. *C.amurensis* sp.n. is distinguished by the cymbial hump without terminal invagination, paracymbium with a large black tooth, and trapeziform proximal portion of the scape (cp. Fig. 1d-f), as well as by the presence of a prolateral spine on tibia I.

DISTRIBUTION. Far East: Middle Amur River, northern Cisamuria, southern and middle Sikhote-Alin Mts; hence, this species is restricted to the Asian mainland, and absent on the Far Eastern islands.

Centromerus arcanus (O.Pickard-Cambridge, 1873).

Linyphia arcana Pickard-Cambridge, 1873: 539.
Centromerus arcanus: Wiehle, 1956: 57 (♂, ♀).

MATERIAL. 8♂, 40♀ - Krasnoyarsk Province, Yenisei River (62° 20N), Mirnoye, taiga of *Picea* and *Pinus sibiricus*, 20-23.VIII.1979, KE; 2♀ - Yenisei, 62° N, Komsa, 9.VIII.1988, ABR; 1♂, 1♀ - Podkamennaya Tunguska River, 35 km upstream off mouth, Rybnaya River, 11-12.IX.1990, ABR; 3♂, 16♀ - Evenk Autonomous Region, basin of Stolbovaya River (right tributary of Podkamennaya Tunguska River, ca. 150 km upstream off mouth), Biropchana River, 28-29.VI.1988, ABR; 3♀ - basin of Stolbovaya River, Dulkuma River, 1-4.VII.1990, ABR; 1♂, 2♀ - Velmo River (left tributary of Podkamennaya Yunguska River), 140 km upstream off mouth, 10.VIII.1990, ABR; 2♂, 1♀ - Velmo River, 93-120 km upstream off mouth, 11-12.VIII.1990, ABR.

DISTRIBUTION. Europe [Wiehle, 1956], Urals [Pakhorukov, 1979; Esyunin, 1991], Middle Siberia [Eskov, 1988 and original data]. The record of this species at the Ussuri River [Eskov, 1992] is referred in fact to *C.amurensis* sp.n.

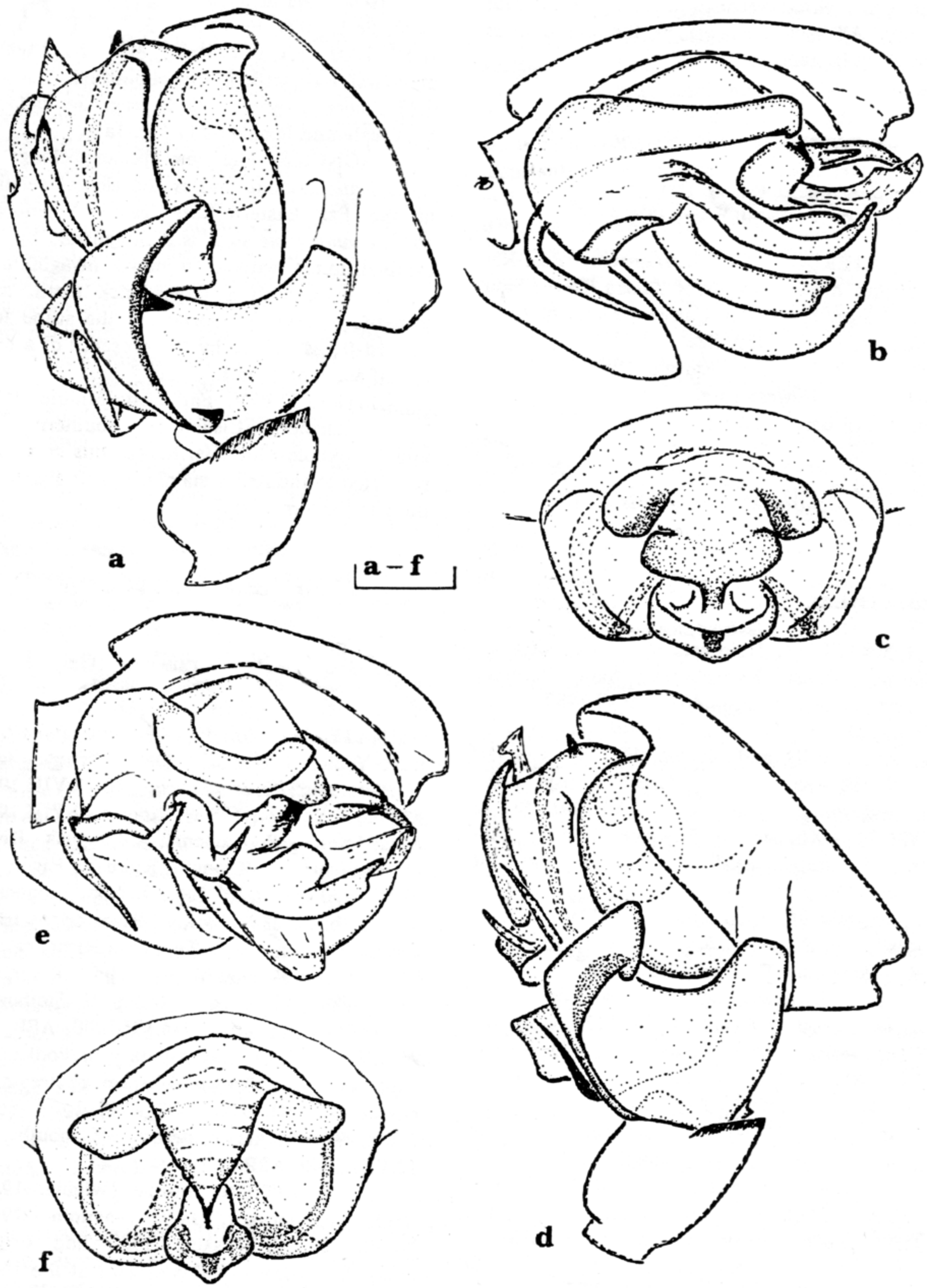


Figure 1. *Centromerus amurensis* sp.n. (a-c) and *Centromerus terrigenus* Yaginuma (d-f): a & d - male palp, ectal view; b & e - male palp, ventral view; c & f - epigyne. Scale = 0.1 mm.

Рисунок 1. *Centromerus amurensis* sp.n. (a-c) и *Centromerus terrigenus* Yaginuma (d-f): a и d - пальпа самца, вид с внешней стороны; b и e - пальпа самца, вид снизу; c и f - эпигина; Масштаб = 0,1 мм.

Centromerus clarus (L.Koch, 1879).
Fig. 2a-c.

Linyphia clara Koch, 1879: 36 (♂).
Linyphia ingloria Koch, 1879: 32 (♀) (synonymized by Holm, 1973).
Linyphia polita Koch, 1879: 26 (♀) (praeoccupied: *Linyphia polita* Blackwall, 1870).
Linypia jeniseica Charitonov, 1932: 77 (nom.nov. pro *Linyphia polita* L.Koch) (synonymized by Holm, 1973).
Centromerus clarus: Holm, 1973: 91 (♂, ♀).

MATERIAL. 4♂, 6♀ - Novosibirsk City, Akademgorodok, 23-30.V.1986, SG; 6♀ - Altai Province, Teletskoye Lake, Artybash, forest of *Abies*, *Pinus sibiricus* and *Betula*, 7-13.VII.1982, SG; 1♂, 1♀ - Krasnoyarsk Province, Yermakovskoye District, West Sayan Mts., upper Us River, taiga of *Picea*, *Abies*, and *Pinus sibiricus*, 15.VIII.1984, ABR; 1♀ - Verkhneusinsk, 5.VI.1989, ABR; 18♂, 23♀ - middle Yenisey River, Mirnoye (62°20N), taiga of *Picea* and *Pinus sibiricus*, 20-23.VIII.1979, KE; 1♂, 1♀ - Alinskoye (63°N), thicket of *Populus tremula*, 28.VII.1978, AV; 1♂- Komsa (62°N), 23.IX.1989, ABR; 1♂- Yelogui River (left tributary of Yenisei), 200 km upstream off mouth, Tyn River mouth, 19.VII.1989, ABR; 2♂, 2♀ - mouth of Podkamennaya Tunguska River, Bor, 4.VI.1988, ABR; 2♂, 5♀ - Rybnaya River (right tributary of Podkamennaya Tunguska, 35 km E off Yenisei), 17.IX.1990, ABR; 2♂, 4♀ - Sukhaya Lebyazhya River (left tributary of Podkamennaya Tunguska, 37 km E off Yenisei), 18-24.IX.1990, ABR; 3♂, 1♀ - Evenk Autonomous District, lower Podkamennaya Tunguska River, mouth of its right tributary Stolbovaya River 25.IX.1989, ABR; 1♂, 4♀ - Kulingna River (basin of Stolbovaya), 30.VIII.1989, ABR; 1♀ - Biropchana River (basin of Stolbovaya), 9.VII.1988, ABR; 2♀ - Dulkuma I River (basin of Stolbovaya), 1-2.VII.1990, ABR; 1♂ , 1♀ - Podkamennaya Tunguska, 12 km upper off Stolbovaya mouth, 7.VIII.1988, ABR; 1♀ - mouth of its right tributary, Kuzmovka River, 12.VIII.1989, ABR; 2♂, 1♀ - Podkamennaya Tunguska, Suiomai, 1-3.X.1989, ABR; 1♂- Velmo River (left tributary of Podkamennaya Tunguska) 120 km upstream off mouth, 11-12.VIII.1990, ABR; 1♂- Velmo River, 173 km upstream off mouth, Chapa River, 8.VIII.1990, ABR; 1♀ - upstream Bakhta River (right tributary id Yenisei), Dulkuma II mouth, VIII.1989, ABR; 1♂- Khakass Autonomous District, Abaza, 11.VI.1990, ABR; 1♂ - Tuva Autonomous Republic, Azas State Reserve, 6-7.VI.1990, ABR; 1♀ - Irkutsk Area, Khamar-Daban Mt.Range, Khamar-Daban meteorological station, h=1500 m, forest of *Pinus sibiricus*, *Alnus*, 10.VII.1988, KM; 1♀ - Buryat Autonomous Republic, Barguzin State Reserve, Litominskoye, 30.VII.1990, MS; 1♀ - Baikal Lake, Svyatoi Nos Peninsula, forest of *Pinus* and *Betula*, 21.VII.1991, SD.

DESCRIPTION. Genitalia of both male and female as in Fig. 2a-c; non-genital characters see in Holm [1973].

DISTRIBUTION. West and South Siberia, eastward up to lower and middle Yenisei [Holm, 1973; Eskov, 1988; original data] and Buryatia (original data), westward up to South [Pakhorukov & Efimik, 1988; Polyanin & Pakhorukov, 1988], Middle [Pakhorukov & Utochkin, 1977 (as *C.jacksoni*); Pakhorukov, 1984] and Polar Urals [Tanasevitch, 1985]. The record of this species at the upper Kolyma River [Eskov, 1988] is referred in fact to *C.pacificus* sp.n. (see below).

Centromerus levitarsis (Simon, 1884).

Tmeticus levitarsis Simon, 1884: 395.
Centromerus levitarsis: Wiehle, 1956: 71 (♂, ♀).

MATERIAL. 15♂, 21♀ - Krasnoyarsk Province, middle Yenisei River, Mirnoye (62°20'N), Varlamovka River, forestless *Sphagnum-Aulacomium* bog with *Betula nana*, 30.VIII.1979, KE.

DISTRIBUTION. Europe [Wiehle, 1956] and Middle Siberia [Eskov, 1988].

Centromerus pacificus sp.n.
Fig. 2d-f.

Centromerus clarus (non L.Koch, 1879): Eskov, 1988: 109 (part.).

MATERIAL. Holotype ♂: 12 km N off Magadan, Snezhnaya Dolina, 12-14.IX.1990, YM. Paratypes: 4♂, 2♀ - together with holotype; 1♀ - same locality, h 800 m, *Pinus pumila* thicket, 15.VI.1986, YM; 1♀ - same locality, southern

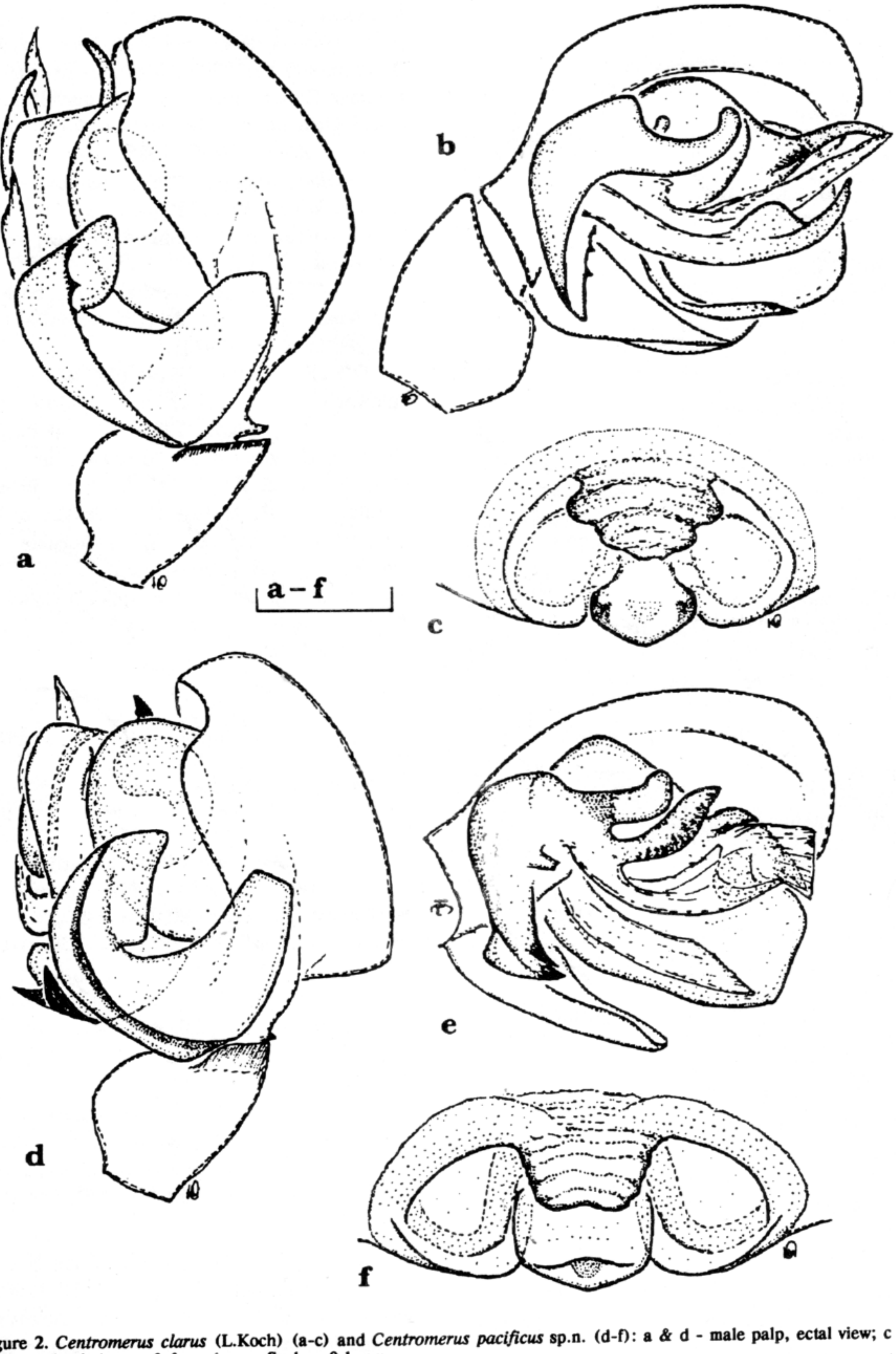


Figure 2. *Centromerus clarus* (L.Koch) (a-c) and *Centromerus pacificus* sp.n. (d-f): a & d - male palp, ectal view; c & e - male palp, ventral view; c & f - epigyne. Scale = 0.1 mm.

Рисунок 2. *Centromerus clarus* (L.Koch) (a-c) и *Centromerus pacificus* sp.n. (d-f): a и d - пальпа самца, вид с внешней стороны; b и e - пальпа самца, вид снизу; c и f - эпигина. Масштаб– 0,1 мм.

exposed rocky debris, 13.IX.1986, YM; 1♂ - 30 km NW off Magadan, 3-7.VIII.1991, YM; 1♀ - 29 km N off Magadan, Dukcha River, 18.VI.1987, YM; 1♀ - Magadan Area, Taui Guba Gulf, 5 km E off Yana River mouth, 29.VIII.1990, YM; 1♂ - SW point of Marchekap Peninsula, 24.IX.1990, AR; 1♂, 1♀ - upper Kolyma River, Sibit-Tyellakh, *Betula* forest with *Vaccinium vitis - idea* at southern slope of sopka, 26.V-5.VI.1983, SB; 3♂, 4♀ - Sakhalin Island, Poronaisk District, middle Rukutama River, 6-17.VI.1988, AB; 1♀ - Khabarovsk Province, Verkhnebureinsky District, Badzhal Mt. Range, h 1000 m, forest of *Picea* and *Larix* with green mosses, 13-14.VIII.1989, DK; 1♂, 2♀ (SMF) - Nanaisky District, lower Amur River, Slavyanka, *Betula* forest, VI-VIII.1983,NR; 5♀ - environs of Khabarovsk, Bolshe-Khekhtsirsky State Reserve, valley broadleaved forest, 13.VI.1987, DL; 1♀ - Amur Area, environs of Arkhara, Khingan State Reserve, *Quercus* forest, 21.VII.1983, YM; 1♀ - same locality, Malyi Khingan Mt. Range, Karapcha River, *Quercus* forest, VIII.1991, GG; 5♀ - Maritime Province, Chuguyevka District, Pravaya Sokolovka River (basin of Ussuri River), *Pinus koraiensis* forest, 10.IX.1974, GK; 1♂, 1♀ - Ussuri State Reserve, valley broadleaved forest, 30.IX.1977, GK & EM; 1♂, 2♀ - Kedrovaya Pad State Reserve, 25.IX.1978, BZ; 3♀ - Chita Area, Kyra District, Sokhonda State Reserve, Agutsa River, h = 1300 m, rocky debris, 13.VI.1991, DL.

DESCRIPTION. Total length of male/female 2.00-2.38/2.13- 2.50. Carapace yellow to dark yellow, its length/width 0.88-1.05/ 0.68-0.75 in male, 0.88-1.18/0.68-0.73 in female. Chelicerae with three promarginal teeth; male chelicera without longitudinal row of short spines. Legs yellow to dark yellow, length of joints I/IV 0.85/0.95+0.25/0.25+0.80/0.88+ +0.68/0.78+0.50/0.50 in male, 0.85/0.98+0.25/ /0.25+0.78/0.90+0.65/0.75+0.48/0.48 in female; leg spinulation: Fe I 1100, Fe II 1000, Fe III-IV 0000, Ti I 2100, Ti II-IV 2000; Mt I-II 1000, Mt III-IV 0000; metatarsi I-III with a trichobothrium, Tm I - 0.33. Abdomen grey to dark grey. Genitalia of both male and female as in Fig. 2a-f.

DIAGNOSIS. The new species belongs to the *sylvaticus*-group and is the closest relative of the West Siberian *C.clarus* L.Koch, 1879. *C.pacificus* sp.n. is distinguished by the clear cymbial hump, paracymbium without row of teeth, and wide scape without constriction (cp. Fig. 2a-c).

REMARK. The record of *C.clarus* from the upper flow of Kolyma River by Eskov [1988] is referred in fact to this new species.

DISTRIBUTION. Northeast Siberia: northern Cisokhotia and upper Kolyma; Far East: middle Sakhalin, northern Cisamuria, middle and lower Amur and southern Sikhote-Alin Mts.; South Siberia: southeastern Transbaikalia. The new species seems to be the eastern vicariant of its closest relative *C.clarus* (L.Koch, 1879) restricted to West and South Siberia.

Centromerus semiater (L.Koch, 1879).

Linyphia semiatra Koch, 1879: 27 (♀).
Centromerus semiater: Holm, 1973: 92.
Centromerus incultus Falconer, 1915: 226 (♀) syn.nov.
Centromerus alnicola Schenkel, 1936: 321 (♀) (synonymized under *C.incultus* by Locket, Millidge & Merret, 1974).
Centromerus alnicola: Miller, 1958: 84 (♂, ♀)
Centromerus incultus: Locket, Millidge & Merret, 1974: 110 (♂, ♀).

MATERIAL. 2♂, 2♀ - Evenk Autonomous Region, Podkamennaya Tunguska River, 150 km upsteam off mouth, mouth of Stolbovaya River, swampy floodland forest of *Betula* with *Salix*, 9.IX.1988, ABR.

REMARKS. Holm [1973] restudied the holotype of *Lihyphia semiatra* and stated it to be a *Centromerus* female, with the epigyne removed and appearently lost. Based on Koch's [1879] description, he supposed its identity to lie either with *C.arcanus* (O.Cambridge, 1873) or with *C.alnicola* Schenkel, 1936. In our opinion, however, the short scapus of the epigyne of *L.semiatra* traceable in Koch's [1879: T.I, Fig.14] figure, as well as the creature's small size (total length 1.50 mm, carapace length 0.72 mm), clearly indicate this species to be just *C.incultus* (= *C.alnicola*). The discovery of both males and females identifiable as *C.incultus* near the locus typicus of *C.semiater* allows us to synonymize both species with fair certainty.

DISTRIBUTION. Central and northern Europe; North Urals [Pakhorukov, 1981]; Yenisei River near Krasnoyarsk [Holm, 1973] and lower Podkamennaya Tunguska River (original data).

Centromerus sylvaticus (Blackwall, 1841).

Neriene sylvatica Blackwall, 1841: 644 (♂).
Centromerus sylvaticus: Wiehle, 1956: 37 (♂, ♀).

MATERIAL. 6♂, 5♀ - Krasnoyarsk Province, Yenisei, Mirnoye (62° 20'N), flood-land meadow, 1.VIII.1979, KE; 1♀ - Rybnaya River (right tributary of Podkamennaya Tunguska, 35 km upstream off mouth), 13.IX.1990, ABR; 2♀ - Evenk Autonomous Region, Podkamennaya Tunguska, Sulomai, 30.VII.1988, ABR; 1♂, 1♀ - Velmo River (left tributary of Podkamennaya Tunguska River) 30 km upstream off mouth, Svetlaya River, 14.VIII.1990, ABR; 1♂- Krasnoyarsk Province, environs of Yermakovskoye, West Sayan Mts., *Carex-Scirpus-Comarum-Sphagnum* swamp in taiga, 21.VIII.1984, ABR; 8♀ - 10 km N of Magadan, Snezhnaya Dolina, 7.X.1984, YM; 3♂- Amur Area, Arkhara, meadow, 12.VIII.1983, YM; 1♂- Sakhalin Island, Okha District, Tungor, 21.IX.1986, AB; 2♀ - Aniva District, Novoalexandrovskoye, 16.IX.1984, AB; 1♀ - environs of Yuzhno-Sakhalinsk, 26.VIII.1991, KE.

DISTRIBUTION. This species possesses a trans-Holarctic range: Europe [Wiehle, 1956] eastward up to the Urals [Esyunin, 1991], North America (both Atlantic and Pacific coasts) [Helsdingen, 1973], and Asia. In Asia, it has been recorded in Transcaucasia [Tanasevitch, 1990], in West [Ermolajew, 1934], Middle [Holm, 1973; Eskov, 1988], South and northeastern Siberia [Eskov,1988], in Kamtchatka [Sytshevskaja, 1935], in Cisamuria [Azheganova & Stentchenko, 1977; Eskov, 1988] and on Sakhalin (original data), as well as in China [Zhu, 1983] and Japan [Yaginuma, 1977].

Centromerus terrigenus Yaginuma, 1972.
Fig. 1d-f.

Centromerus terrigenus Yaginuma, 1972: 24 (♀).
Centromerus terrigenus: Saito, 1983: 53 (♂, ♀).

MATERIAL. 1♂, 5♀ - Sakhalin Island, environs of Yuzhno-Sakhalinsk, Dolina Turistov, 17.X.1987, AB; 1♂, 1♀ - same locality, 25.IX.1988, AB; 2♂, 1♀ - Okha District, lower Beryozovka River (basin of Bolshaya River), IX.1990, AB; 1♀ - Piltun Gulf, Sebo, 4-18.X.1990, AB; 1♂, 1♀ - Poronaisk District, middle Rukutama River, 7-16.IV.1988, AB; 1♀ - Dolinsk District, Naiba River, 10 km upstream off Bykov, meadow, 20-25.VIII.1991, KE; 2♂, 2♀ - Tomari District, Ainskoye Lake, Ptichya River, meadow, 12-13.V.1984, AB; 1♀ - Korsakovskoye District, Lesnoye, 24.IX.1987, AB; 2♂, 3♀ - Aniva District, Ulyanovka River, 21-22.IV. 1989, AB; 2♂, 1♀ (SMF) - Novoalexandrovskoye, 9.VII.1989, AB; 1♂, 1♀ - Kuril Islands, Kunashir Island, Kisly Spring, 12.VI.1989, AB; 1♀ - Iturup Island, Kurilsk, 20-24.VI.1989, AB.

DESCRIPTION. Total length of male/female 2.50-2.75/2.20-2.50. Carapace brownish-yellow, its length/width 1.10-1.25/0.88-0.95 in male, 0.88-1.00/0.65-0.70 in female. Chelicerae with three promarginal teeth; male chelicerae with anterolateral longitudinal row of short spines. Legs brownish-yellow, length of joints I/IV 0.88/1.00+0.28/0.28+0.83/0.90+0.68//0.73+0.48/0.50 in male, 0.75/0.85+0.25/0.25++0.63/0.75+0.53/0.58+0.40/0.45 in female; leg spinulation: Fe I 1100, Fe II 1000, Fe III-IV 0000, Ti I-IV 2222, Mt I-II 1000, Mt III-IV 0000; metatarsi I-III with a trichobothrium, Tm I - 0.30. Abdomen dark grey. Genitalia of both male and female as in Fig. 1d-f.

DISTRIBUTION. Far East: Sakhalin (both northern and southern), South Kuril Islands (Kunashir and Iturup) (original data); previously, it has been recorded only in Hokkaido and Honshu Islands, Japan [Yaginuma, 1972, 1977]. This species seems to be restricted to Far Eastern islands and absent from mainland Asia.

Centromerus ussuricus **sp.n.**
Fig. 3a-c.

MATERIAL. Holotype, ♂ Maritime Province, Ussuri State Reserve, valley forest of

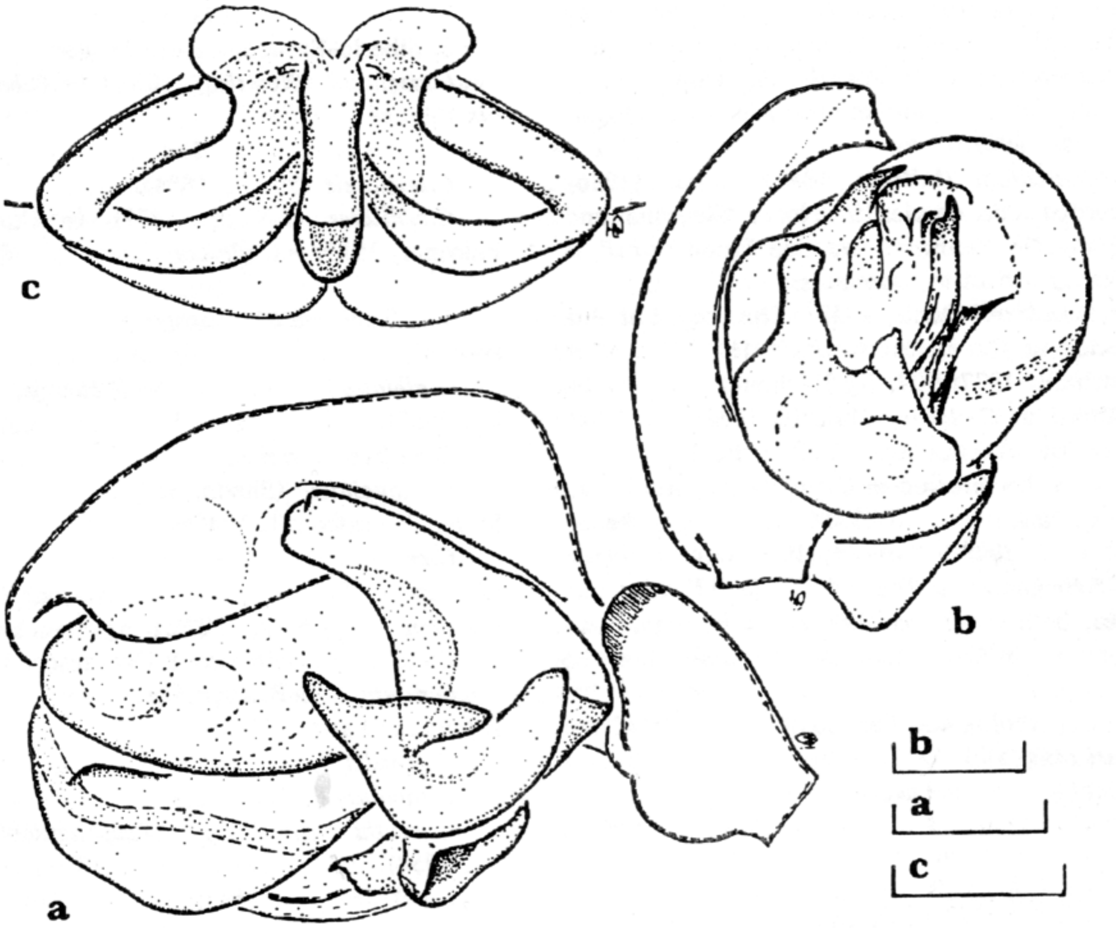


Figure 3. *Centromerus ussuricus* sp.n.: a - male palp, ectal view; b - male palp, ventral view; c - epigyne. Scales = 0.1 mm.
Рисунок 3. *Centromerus ussuricus* sp.n.: a - пальпа самца, вид с внешней стороны; b - пальпа самца, вид снизу; c - эпигина. Масштаб = 0,1 мм.

Pinus koraiensis, 3.IX.1977, GK & EM. Paratypes: 3♀ - same locality, 3.VII.1980, VB; 1♂ - Amur Area, Khingan State Reserve, Malyi Khingan Mt. Range, Karapcha River, *Quercus* forest, VIII.1991, GG).

DESCRIPTION. Total length of male/female 2.05/1.65-2.00. Carapace yellow, its length/width 1.00/0.65 in male, 0.65-0.90/0.50-0.58 in female. Chelicerae with 3 promarginal teeth; male chelicerae without longitudinal row of short spines. Legs yellow, length of joints I/IV 0.88/1.05+0.25/0.25+-/0.98+-/0.80+-/0.63 in male, 0.73/0.83+0.25/0.25+ +0.68/0.75+0.58/0.70+0.45/0.50 in female; leg spinulation: Fe I 1100, Fe II 1000, Fe III-IV 0000, Ti I-IV 2000, Mt I-II 1000, Mt III-IV 0000; metatarsi I-III with a trichobothrium, Tm I - 0.30. Abdomen pale grey to grey. Genitalia of both male and female as in Fig. 3a-c.

DIAGNOSIS. The new species seems to be related to the European *C.incilium* (L.Koch, 1881), but is clearly distinguished by the T-shaped proximal portion of the paracymbium and by the wide and relatively short epigyne with a long scape (cp. Wiehle, 1956: figs 46-50).

DISTRIBUTION. Far East: southern Sikhote Alin Mts. and middle Amur River.

The records of the following five *Centromerus* species in North Asia seems to be based on misidentifications:

C.dilutus (O.Pickard-Cambridge, 1875). This species was recorded in Kamtchatka by Sytshevskaya [1935]. A restudy of the original specimen kept at the ZMMU (Ta-4258) demonstrated its assignment to *Tunagyna debilis* (Banks, 1892).

C.incilium (L.Koch, 1881). Eskov [1986] recorded this species in North Cisuralia and the middle Yenisei flow. The latter record is referred in fact to *C.arcanus*.

C.jacksoni Denis, 1952*. The record of this species in the northern Urals [Pakhorukov & Utochkin, 1977: 907, fig.2] should certainly be referred to *C.clarus*, while its record in Amur Area by Azheganova & Stenchenko [1977] seems to be referred to *C.pacificus* sp.n.

C.pabulator (O.Pickard-Cambridge, 1875) and *C.subalpinus* Lessert, 1907 were reported by Azheganova & Stenchenko [1977] in Amur Area; both these records seem to be highly improbable; in the latter case *C.semiater* may be supposed.

Concerning the Far Eastern records of the *C.arcanus* and *C.clarus* see *C.amurensis* and *C.pacificus*, respectively.

Zoogeography of *Centromerus*.

Taking in account the newly described species, the synonymy and the generic reallocations, the genus now comprises 72 species. Ten species distribution patterns can be distinguished:

1. Temperate Asian pattern (5 species).

C.amurensis sp.n.

L.polita (L.Koch, 1879) (= *L.ingloria* *L.Koch, 1879*).

C.pacificus sp.n.

C.terrigenus Yaginuma, 1972.

C.ussuricus sp.n.

2. Subtropical Asian pattern (3 species).

C.forficalus Zhu & Tu, 1986.

C.tianmushanus Chen & Song, 1987.

C.yadongensis Hu & Li, 1987.

3. Siberio-European pattern (4 species).

C.aequalis (Westring, 1851) (= *C.brevipalpis* (Menge, 1866)).

C.arcanus (O.Pickard-Cambridge, 1873).

C.levitarsis (Simon, 1884).

C.semiater (L.Koch, 1879) (= *C.incultus* Falconer, 1915; = *C.alnicola* Schenkel, 1936).

4. Temperate European pattern (21 species).

C.albidus Simon, 1929 (= *C.quercicola* Miller, 1958).

C.andrescui Weiss, 1987.

C.capucinus (Simon, 1884) (= *C.novaki* Miller & Kratochvil, 1940).

C.cavernarium (L.Koch, 1872) (= *C.jacksoni* Denis, 1952; = *C.drescoi* Denis, 1952; = *C.pallens* Bosenberg, 1902).

C.dacicus Dumitresco & Georgesco, 1980.

C.dilutus (O.Pickard-Cambridge, 1875 (= *C.tantulus* Parker, 1962).

C.gentilis Dumitreco & Georgesco, 1980.

C.incilium (L.Koch, 1881).

C.leruthi Fage, 1933 (= *C.sphagnicola* Miller, 1958).

C.obscurus Bosenberg, 1902.

C.pabulator (O.Pickard-Cambridge, 1875).

C.pallidulus Schenkel, 1929.

C.persimilis (O.Cambr., 1912) (= *C.strandi* Miller, 1937).

C.satyrus (Simon, 1884).

C.sellarius (Simon, 1884) (=*C.germanicus* Strand, 1907).

C.serratus (O.Pickard-Cambridge, 1875).

C.setosus Miller & Kratochvil, 1940.

C.silvicola (Kulczynski, 1887).

C.similis Kulczynski, 1894.

C.subalpinus Lessert, 1907.

C.unidentatus Miller, 1958.

5. Eurotemperate-Mediterranean pattern (1 species).

C.prudens (O.Pickard-Cambridge, 1873) (= *C.subacutus* (O.Pickard-Cambridge, 1891; = *C.parkeri* Cooke, 1967).

* *C.jacksoni* have been stated to be a junior synonym of *C.cavernarum* (L.Koch, 1872) by Proszynski & Starega [1971].

6. West Mediterranean pattern (19 species).
C.andrei Dresco, 1952.
C.balazuci Dresco, 1952.
C.bonaeviae Brignoli, 1979.
C.cinctus (Simon, 1884) (= *C.c.phoceorum* Simon, 1929).
C.cottarellii Brignoli, 1979.
C.desmeti Bosmans, 1986.
C.dolomitensis Denis, 1963.
C.europaeus (Simon, 1911).
C.fagicola Denis, 1948.
C.paradoxus (Simon, 1884).
C.pasquinii Brignoli, 1971.
C.puddui Brignoli, 1979.
C.sinuatus Bosmans, 1986.
C.sinus (Simon, 1884).
C.succinus (Simon, 1884).
C.tridentinus Capporiacco, 1952.
C.tumidus (Simon, 1884).
C.variegatus Denis, 1962.
C.viduus Fage, 1931.

7. East Mediterranean pattern (10 species).
C.bulgarianus (Drensky, 1931).
C.chappuisi Fage, 1931.
C.lakatnikensis (Drensky, 1931).
C.milleri Deltshev, 1974.
C.minor Tanasevitch, 1990.
C.obenbergi Kratochvil & Miller, 1939.
C.subsaecus Kulczynski, 1914.
C.sylvaticus paucidentatus Deltshev, 1983.
C.unicolor Roewer, 1959.
C.valkanovi Deltshev, 1983.

8. East Nearctic pattern (7 species).
C.cornupalpis (O.Pickard-Cambridge, 1875).
C.denticulatus (Emerton, 1909) (=*C.claytoni* Chamberlin & Ivie, 1944).
C.furcatus (Emerton, 1882).
C.latidens (Emertom, 1882) (=*Microneta luteola* Banks, 1892).
C.longibulbus (Emerton, 1882).
C.persolutus (O.Pickard-Cambridge, 1875).
C.tennapax (Barrows, 1940).

9. West Nearctic pattern (1 species).
Centromerus sp. (Helsdingen, 1973: 29, figs. 25-26).

10. Trans-Holarctic pattern (1 species).
C.sylvaticus (Blackwall, 1841) (= *C.quinquedentatus* (Emerton, 1882)).

The following regularities in the species distribution should be noted:

(1) There is a single trans-Holarctic species, i.e. *C.sylvaticus*; neither trans-Palearctic nor trans-Nearctic species are known.

(2) Although several temperate European species (i.e. *C.cavernarium, C.incilium, C.pabulator, C.satyrus, C.sellarius, C.silvicola*) penetrate the Mediterranean periphery, only a single species, i.e. *C.prudens*, can be called as really Euro-Mediterranean. Despite the existence of some locally distributed species in East (i.e. *C.andrescui, C.dacicus, C.gentilis*), West (*C.satyrus*) and Central Europe (i.e. *C.pallidulus, C.setosus, C.subalpinus*), the fauna of temperate Europe as a whole seems to be homogeneous and indivisible. On the contrary, no species are known to be common for both West and East Mediterranean; a single West Mediterranean species (*C.europaeus*) penetrates the western margin of the East Mediterranean.

(3) The faunas of the Atlantic and Pacific coasts of North America are completely isolated from each other. The localities of *C.cornupalpis* at the eastern macroslope of Rocky Mountains (s. Helsdingen, 1973) seem to be the westernmost limit in the distribution of the East Nearctic fauna.

(4) The easternmost limit in the distribution of all the Siberio-European species is the western edge of the Middle-Siberian Table-land ("Yenisei border") in the north and Baikal Lake in the south; *C.clarus* should be included in this geographical group. All the remaining Asian species are restricted to the Far East (i.e. the Pacific coast of Asia).

(5) The species diversity in the West Palearctic, i.e. Europe plus Mediterranean (56 species), is much higher than in the Far East and Atlantic Nearctic (7 and 8 species, respectively).

(6) The fauna of the eastern margin of the Mediterranean, i.e. Asia Minor and the Caucasus, is quite poor (*C.minor, C.sylvaticus* and *C.unicolor*); in Middle Asia no *Centromerus* species are still known (see Tanasevitch, 1989). Hence, a remarkable gradient may be observed

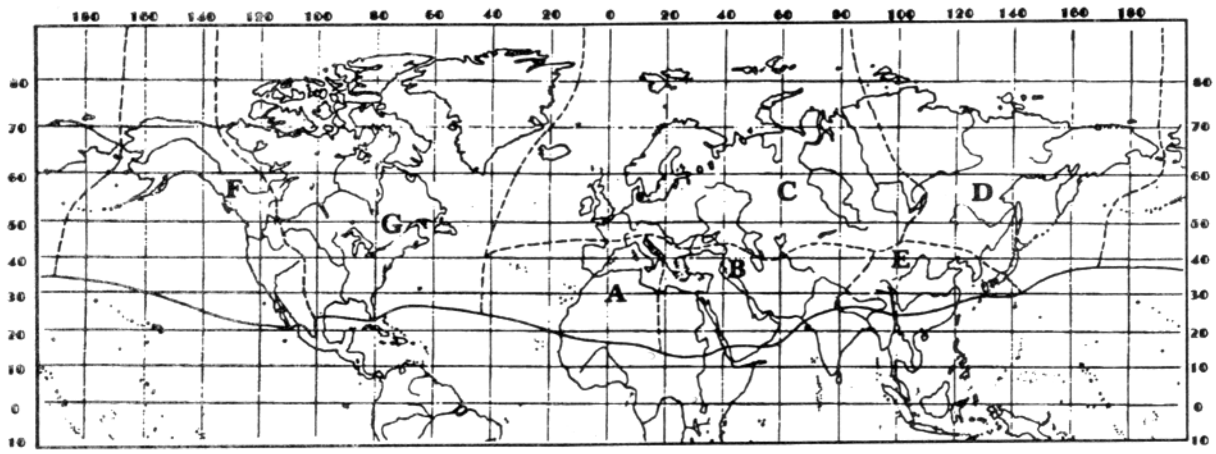


Figure 4. Regioning of the Holarctic based on the distribution of *Centromerus*. Regions: A - West Mediterranean; B - East Mediterranean; C - West Siberio - European; D - East Siberio -Manchurian; E - Chinese - Tibetan; F - West Nearctic; G - East Nearctic.

Рисунок 4. Районирование Голарктики на основе распространения *Centromerus*. Регионы: A - Западносредиземноморский; B - Восточносредиземноморский; C - Западносибирско-Европейский; D - Восточносибирско-Маньчжурский; E - Китайско-Тибетский; F - Западнонеарктический; G - Восточнонеарктический.

Regions	Species diversity	Endemics (number/percent)
West Mediterranean	21	19/90%
East Mediterranean	12	10/83%
West Siberio-European	28	26/93%
East Siberio-Manchurian	5	4/80%
Chinese-Tibetan	3	3/100%
East Nearctic	8	7/88%
West Nearctic	2	1/50%

in the so-called "Ancient-Mediterranean": the faunas of the West Mediterranean, Balkans, Asia Minor with the Caucasus, and Middle Asia consist of 21, 10, 3 and 0 species, respectively.

(7) If one compares two zones, i.e. temperate and subtropical, in three regions, i.e. Europe, Far East and Atlantic North America, the faunal diversity is increased from north to south in Europe (31/ 27 species), being vice versa in Asia and North America (3/5* and 2/8 species, respectively). On the other hand, both in Europe and in the Far East the faunas of temperate and subtropical regions are strictly separated, while there are no endemic species whatever in the subtropical East Nearctic.

According to the regularities (1)-(4), the regioning of the Holarctic as based on the distributon of *Centromerus* may be attempted. The regions should be delimited by means of minimization of the number of species ranges overlapping a border; the following seven regions have been errected by such a way (see Fig. 4):

The abovementioned marginal penetration of some European species into both Mediterranean regions is negected here. The border between West Siberio-European and East Siberio-Manchurian regions corresponds strictly to the line dividing the ranges of the two vicariants, i.e. *C.clarus* and *C.pacificus*.

Based on the regularities (5)-(7), some historical interpretations my be proposed. First of all, a good accordance between the regioning of the Holarctic based on the distribution of *Cen-*

* This ratio may change in the future as a result of studies of the presently poorly investigated Chinese fauna.

tromerus (Fig. 4) and that of the theridiid genus *Robertus* (see Eskov, 1987: Map. 1) should be noted; there is a separation of the Palearctic and Nearctic, both divided meridionally by Yenisei Border and Rocky Mountains, respectively. However, in *Robertus*, which was estimated by Eskov [1987] as a typical nemoral taxon, the Palearctic was divided only into two regions. The existence in *Centromerus* of particular centers of endemism in the southernmost portions of the Palearctic (West and East Mediterranean, Chinese) is reflected in respective regions. This allows us to suppose this genus as subtropical rather than nemoral in origin, despite its remarkable species diversity in the nemoral zone of Europe.

The nemoral taxa of a trans-Holarctic distribution pattern demonstrate, as a rull, three centers of species diversity and endemism, i.e. Europe, Manchuria (sensu lato) and Atlantic North America; two latter centers usually dominate. In the case of *Centeromerus*, the situation is reversed. The absence in *Centromerus* of Euro-Far Eastern disjunct species ranges, as well as the Manchuro-Appalachian connections, both known to be characteristic of the nemoral taxa, should be noted too.

As a result, the following scheme may be proposed. The genus *Centromerus* might have originated in the western portion of the subtropical zone of Europe; after the genus penetrated the nemoral belt of Europe, an important secondary center of diversity appeared. The eastward expansion of the genus along the subtropics was quite weak: the species diversity regularly declined eastward up to zero in Middle Asia. On the contrary, expansion along the nemoral zone, both eastward and westward, seems to have been successful. Secondary centers of diversity and endemism appeared just in the nemoral zones of the Far East and Atlantic North America. Due to the extreme poverty of the Pacific North American faunas, a trans-Atlantic way of dispersal seems to have been more versimilar rather than trans-Beringian. Later, only a few members of the Appalachian and Manchurian fauna penetrated secondarily the American and Asian subtropics (i.e. Alabama and Florida on the one hand, and Hunan, Hebei and Tibet (= Xizang) on the other); only in the latter case a small but independent center of endemism (3 species) originated.

Only 9 species (i.e. *C.aequalis, C.arcanus, C.clarus, C.incilium, C.levitarsis, C.pacificus, C.semiater, C.sylvaticus, C.unidentatus*) have been recorded in the boreal zone of Eurasia, and 5 species (i.e. *C.furcatus, C.latidens, C.longibulbis, C.persolutus, C.sylvaticus*) in that of North America; the above species are not restricted to this zone and all seem to be nemoral in origin. The origin of the Siberian *C.clarus* can be associated with nemoral glacial refuges in the Altais and Sayan Mts. in southern Siberia. Hence, no boreal elements, contrary to the nemoral and subtropical ones, may be designated among *Centromerus* species.

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